

## CLAIMS

What is claimed is:

1 1. A method comprising:

2 providing a first wafer having a stack structure of a first base substrate, a  
3 layer of relaxed film, and a first layer of strained film,

4 depositing a layer of oxide onto the layer of strained film to provide an  
5 adhesion surface to the first wafer;

6 providing a second wafer, the second wafer being a silicon on insulation  
7 (SOI) wafer having a stack structure of a second base substrate and a layer of oxidized  
8 film;

9 attaching the first and second wafers; and

10 heating the first and second wafers at a first temperature to cause a  
11 silicon dioxide ( $\text{SiO}_2$ ) adhesion of the first substrate to the second substrate.

1 2. The method of claim 1 further comprising:

2 implanting hydrogen onto the first wafer before depositing the layer of  
3 oxide onto the second layer of strained film to create an embrittled region in the layer  
4 of relaxed film.

1 3. The method of claim 2 further comprising:

2 heating the first and second wafers at a second temperature to  
3 delaminate the two wafers along the embrittled region to form the second wafer having  
4 the layer of relaxed film.

1 4. The method of claim 3 further comprising:

2 etching the relaxed film on the surface of the second wafer to expose the  
3 strained film.

1 5. The method of claim 1 wherein the first and second base substrates are  
2 made of silicon material.

1 6. The method of claim 1 wherein the layer of relaxed film is a relaxed  
2 Silicon Germanium (SiGe) layer having a thickness in a range of approximately 0.1 to  
3 3.0um.

4 7. The method of claim 1 wherein the layer of oxide is deposited at a  
5 thickness range of approximately 50 to 3000A.

1 8. The method of claim 2 wherein the hydrogen is implanted at an energy  
2 range of approximately 1 to 20keV.

1 9. The method of claim 3 wherein the second temperature is higher than  
2 the first temperature.

1 10. The method of claim 3 wherein the first temperature is in a range of  
2 approximately 100 °C to 300 °C.

1 11. The method of claim 3 wherein the second temperature is in a range of  
2 400 °C to 600 °C.

1 12. The method of claim 1 further comprising:

2 etching the first base substrate, and the layer of relaxed film to result in  
3 the strain of film on the surface of the SOI wafer.

1 13. The method of claim 12 wherein the etching of the first layer of strained  
2 film comprises wet etching the layer of relaxed film.

1 14. A wafer comprising:  
2 a silicon layer;

- 3 a relaxed SiGe layer; and  
4 a strained silicon layer in contact with the relaxed SiGe layer, the strained  
5 silicon layer being transferred to the top of the relaxed SiGe layer by a heat treatment.

1 15. The wafer of claim 14 wherein the relaxed SiGe layer contains an  
2 embrittled region.

1 16. The wafer of claim 15 wherein the embrittled report is created by  
2 implanting hydrogen ions.

1 17. A wafer comprising:  
2 a silicon layer;  
3 a SiO<sub>2</sub> layer in contact with the silicon layer; and  
4 a strained silicon layer on top of the SiO<sub>2</sub> layer, the strained silicon layer being  
5 transferred to an oxidized wafer by a heat treatment.

1 18. The wafer of claim 17 wherein the oxidized wafer contains a relaxed  
2 SiGe layer.

1 19. The wafer of claim 18 wherein the relaxed SiGe layer contains an  
2 embrittled region.